# REVISED PCB ABATEMENT WORK PLAN
# THE METROPLITAN DISTRICT
# NEPAUG DAM
# BURLINGTON, CONNECTICUT

PREPARED FOR:
The Metropolitan District
Hartford, Connecticut

PREPARED BY:
GZA GeoEnvironmental, Inc.
Norwood, Massachusetts

August 2011
File No. 01.0019395.70

**GZA**
**GeoEnvironmental, Inc.**

*Engineers and*
*Scientists*

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Re: Revised Polychlorinated Biphenyl Abatement Work Plan
The Metropolitan District
Nepaug Dam
Burlington, Connecticut

Dear Ms. Tisa;

On behalf of The Metropolitan District (MDC), GZA GeoEnvironmental, Inc. (GZA) has prepared this Revised Abatement Work Plan for the removal of caulk and building materials containing polychlorinated biphenyls (PCBs). This work plan has been prepared to support an application under the 40 CFR 761.79(h) and 40 CFR 761.61(a) for USEPA approval of alternative decontamination and sampling approaches for specified materials impacted by specified non-liquid PCB-containing caulk.

Thank you very much for your assistance on this project. We look forward to receiving your approval of this plan. If we can provide anything additional please contact the undersigned at (781) 278-3700, or contact Ms. Sally Keating, P.E. of MDC at (860) 278-7850 extension 3335.

Sincerely,

GZA GEOENVIRONMENTAL, INC.

David E. Leone
Senior Project Manager

Peter H. Baril, P.E.
Project Reviewer

Michael F. Conway
Principal

cc: Sally Keating, MDC
Lori Saliby, CTDEP

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## 1.00 INTRODUCTION

The Metropolitan District (MDC) operates the Nepaug Dam in Burlington, Connecticut as part of the MDC Water Supply System. Figure 1 is a locus plan presenting the location of the dam. Figure 2 depicts pertinent features of the dam, which is the subject of this work plan.

During the course of a dam safety inspection in early-2008, GZA observed the presence of sealants in the expansion joints between the concrete blocks on the upstream face of the dam. This sealant (i.e. caulk) was observed both above and just below the water line. Results of chemical testing analyses conducted on samples of the caulk indicated the presence of polychlorinated biphenyls (PCBs) above the allowable concentrations as regulated by the United States Environmental Protection Agency (USEPA) under the Toxic Substance Control Act (TSCA) regulations.

Studies conducted by the MDC and GZA, to define the extent of impacts to adjacent materials from the presence of PCB caulk, have indicated that abatement and remedial actions are required to achieve compliance with Federal regulations in the Code of Federal Regulations Title 40 Section 761 (40 CFR 761). The required work includes the removal of identified PCB-containing caulk, and removal of adjacent concrete where laboratory analyses have identified PCB concentrations exceeding the cleanup and compliance criteria of 1 part per million (ppm).

This work plan, developed by GZA, has been prepared to support an application under the 40 CFR 761.79(h) and 40 CFR 761.61(a) for USEPA approval of alternative decontamination and sampling approaches for specified materials impacted by specified non-liquid PCB-containing caulk. This work plan is subject to the limitations presented in Appendix A.

The MDC representative who will be responsible for this project is Sally Keating. Contact information is provided below:

Sally Keating, P.E.
Manager of Environment, Health and Safety
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Determination of achievement of acceptance criteria will be based on post-abatement confirmatory bulk sampling. For this project, the acceptance criteria will require that remaining concrete not contain PCBs at concentrations greater than 1 ppm.

Abatement procedures will consist of the removal of PCB caulk and PCB-impacted adjacent concrete exhibiting PCB concentrations greater than 1 ppm. The work includes the removal of PCB caulk from three vertical joints in the upstream face of the dam and the removal of PCB-impacted concrete from areas adjacent to these joints. PCB abatement

work at the dam will be conducted utilizing engineering controls to minimize the potential for migration of PCBs. At no point will the abatement contractor mechanically cut into the caulk or PCB-impacted concrete without the use of vacuum attached capture devices. Caulk and removed concrete from within 1 inch of a caulk seam will be disposed of as PCB bulk product waste exhibiting PCBs at or greater than 50 ppm at a TSCA approved disposal facility. Other debris generated during the work including concrete not within 1 inch of a caulk seam, which has been demonstrated to exhibit PCB concentrations less than 50 ppm, may be disposed of at an acceptable subtitle D facility; however, given the limited volume of this material anticipated, the selected abatement contractor may choose to avoid the segregation and tracking requirements and dispose of all of this material as PCB bulk product waste.

It is anticipated that the abatement work will be conducted concurrently with other, planned dam safety-related improvements at Nepaug Dam, including repairs to the spillway and bridge structures.

## 2.00 CASE NARRATIVE

The following sections present available information regarding the Nepaug Dam and the extent of PCB impacts.

### 2.10 NEPAUG DAM DESCRIPTION AND HISTORY

The structures at Nepaug Reservoir are a key part of the overall water supply system for MDC's member communities including, Bloomfield, East Hartford, Hartford, Newington, Rocky Hill, West Hartford, Wethersfield and Windsor, Connecticut. The Nepaug Dam is a curved, concrete gravity dam consisting of cyclopean masonry. The dam is approximately 650 feet long with a top width of about 22 feet. Its height above the original Nepaug River valley bottom is approximately 115 feet; the total maximum height (i.e. from top of dam to the bottom of the lowest bedrock excavation is about 156 feet). The approximately 175-foot long spillway is located in the center of the dam with a roadway/bridge supported over the spillway on five concrete arches, each 35 feet in length. The downstream face of the spillway consists of 13 stone masonry steps to dissipate energy as water falls the approximate 100 feet to the toe of the dam.

The preparatory subsurface work for Nepaug Dam was underway by 1912 and the construction at the dam site began in 1914 and was completed in 1917. Based on our review of design drawings made available by the MDC, the concrete of the dam was poured in thirteen segments, or blocks. The spillway is comprised of blocks 1 through 6; blocks 7, 9, 11 and 13 are located on the eastern side of the spillway; and blocks 8, 10, and 12 are located on the western side of the spillway. The layout of the numbered blocks is indicated on Figure 2.

Repairs to the upstream face of the Nepaug Dam were conducted in stages between the late 1950s and 1980s, and included the replacement of caulk in vertical joints between concrete blocks (i.e. seams) on the upstream face of the dam (see Section 2.60). During a dam-safety inspection in 2008, GZA noted the presence of this caulk and recommended that samples be analyzed for the presence of PCBs. Caulk was observed in the joints between

blocks outside the spillway. No caulk was observed within the spillway (i.e. the joints between blocks 3/1, 1/2, 2/4 and 4/6). Photographs of pertinent features of the Nepaug Dam are included in Appendix B.

## 2.20 INITIAL CAULK SAMPLING

On October 23, 2008, a GZA representative visited the Nepaug Dam to conduct a visual reconnaissance of the extent of suspect caulk, and to collect representative samples. Caulk was observed in joints on the lower portion of the upstream side of the dam on both sides of, but not within the spillway span, at one location on the bridge deck, and downstream at one location, the joint between the spillway wall and the lower gate house. Caulk was not observed between the blocks on the downstream side of the dam. Eight caulk samples were collected: six from between masonry blocks at the upstream face of the dam; one from the bridge deck; and one from the spillway retaining wall-lower gate house location (spillway sample). Sample collection from the upstream face of the dam was conducted utilizing an MDC boat. The samples were collected from above the water level. The approximate sample locations are indicated on Figure 2. The eight samples were submitted to Alpha Analytical Inc. (Alpha), of Westborough, Massachusetts for analysis for PCBs using EPA Method 3540C Manual Soxhlet Extraction followed by Method 8082 PCB analysis.

PCB analytical results were below the method detection limit in seven of the eight samples. However, the sample collected from the expansion joint between upstream blocks 11 and 13 (incorrectly labeled "PCB1.between9&11") contained PCBs, specifically Aroclor 1260, at a concentration of 189 ppm. To confirm this result, GZA requested that the laboratory re-extract and re-analyze this sample. The subsequent analysis indicated a similar concentration of PCBs (138 ppm). Analytical data is summarized on Table 1, and the laboratory analytical reports are included in Appendix C.

## 2.30 SUPPLEMENTAL MDC SAMPLING

Subsequent to these findings, MDC personnel conducted additional sampling and analysis of caulk and adjacent building materials at the upstream face of the dam. The MDC sampling program was undertaken to confirm and expand upon GZA's results. MDC personnel obtained a series of caulk samples from expansion joints on the upstream face of the dam. MDC's memorandum documenting the sampling and results is presented as Appendix D, and laboratory analytical reports from the MDC sampling are included in Appendix C. Results from the MDC sampling indicated that PCBs were detected in caulk samples obtained from between blocks 11 and 13, and from between blocks 6 and 8. Sampling results indicated total PCB concentrations of 240,000 ppm in a sample of dark gray caulk collected from between blocks 11 and 13; 150 ppm in a sample of white caulk collected from between blocks 11 and 13; and 66 ppm in a sample of light gray caulk collected from between blocks 6 and 8.

In addition to sampling caulk, MDC personnel obtained samples of foam, tar and concrete from the joint between blocks 9 and 11; concrete samples adjacent to the joint between blocks 11 and 13 (on the block 13 side); and a surface water sample adjacent to the joint between blocks 11 and 13. Results of the analyses of these samples indicated PCBs were detected in the concrete samples obtained from block 13 (4,200 ppm for a sample obtained

immediately adjacent to the caulk joint, and 43 ppm for a sample obtained 1.5 inches from the caulk joint). These results indicate the potential that the concrete samples obtained by MDC included residual caulk in the sample. Analysis of the remaining foam, tar, concrete and water samples did not indicate PCBs above the laboratory detection limits.

MDC personnel presented results of their sampling program to the USEPA and Connecticut Department of Environmental Protection (CTDEP), and a site visit was conducted on May 18, 2009 by representatives of the three organizations to observe conditions at the dam. Personnel from the regulatory agencies reportedly raised additional concerns regarding the potential presence of PCB impacts from current or former caulk around windows at the Upper Gate House, and from potential PCB-containing paint on the exterior of the Upper Gate House. In addition, MDC personnel raised a concern regarding caulk noted on construction drawings for the west (left, looking downstream) retaining wall of the spillway pool and discharge channel at the toe of the dam. Subsequent GZA sampling and analysis of these areas are discussed in Section 2.40 below. MDC also recommended the sampling of surface water adjacent to the caulk seam between blocks 6 and 8.

## 2.40 ADDITIONAL GZA SAMPLING

Between July and October 2010, GZA personnel conducted additional sampling at the Site to further define the extent of PCB-containing caulk and impacts to adjacent building material. Analytical results for these samples are summarized on Tables 1 and 2, and laboratory analytical reports are included in Appendix C.

Caulk samples were obtained from between blocks 3 and 5, blocks 6 and 8, blocks 7 and 9 and blocks 8 and 10. The samples from between blocks 3 and 5, and one sample from between blocks 6 and 8 were gray caulk, while the remaining samples were white caulk. The samples were submitted to Alpha for analysis for PCBs. Results indicated concentrations of PCBs in the gray caulk ranging from 20,500 ppm to 238,000 ppm. Most of the white caulk samples did not have PCBs above the laboratory detection limits; however, at the joint between blocks 6 and 8, the white caulk sample had a concentration of 26.2 ppm. GZA believes that the white caulk at this location has been impacted by PCBs leaching from the gray caulk.

GZA also obtained samples of caulk from three locations along the west retaining wall of the spillway pool and discharge channel and from two locations at the Upper Gate House; and one sample of paint from the exterior of the Upper Gate House. The samples were submitted to Alpha for analysis for PCBs. Results of the analysis were below 1 ppm for all six samples.

Based on results of the previous caulk sampling, GZA conducted additional sampling intended to further delineate impacts to the concrete blocks in contact with PCB-containing caulk on the upstream surface of the dam. Joints where PCB-containing caulk was identified included the joints between blocks 3 and 5, blocks 6 and 8, and blocks 11 and 13. The caulk seam between blocks 3 and 5 and blocks 6 and 8 are between the upstream dam face and cutwater structures on either side of the spillway (see Figure 2 and attached photographs); while the seam between blocks 11 and 13 separates two concrete slabs. Samples were collected at certain horizontal distances from the caulk joint (1 inch, 3

inches, 6 inches and/or 12 inches). At each distance, samples were collected in ½ inch depth intervals to varying final depths. At the intersections of blocks 3 and 5 and blocks 6 and 8, samples were collected from both sides of the joint because of the different nature of the structure (concrete slab on one side, cutwater on the other side); at the intersection of blocks 11 and 13, samples were collected from only one side (MDC personnel had previously obtained samples from the other side). The surfaces of the cutwaters, which project into the reservoir, currently consist of shot-crete (i.e. cement/sand/mortar mixture sprayed onto formwork). Concrete sampling was conducted in general accordance with USEPA's standard operating procedure for the collection of concrete dust samples. The samples were analyzed in an iterative manner, with the shallow samples closest to the joint analyzed first, and deeper or more distant samples analyzed in cases where previous sampling indicated results greater than 1 ppm.

At the joint between blocks 11 and 13, PCBs greater than 1 ppm were not observed at the 1 inch concrete samples. Likewise, PCBs greater than 1 ppm were not observed at the 1 inch samples obtained from blocks 5 (joint 3/5) and 8 (joint 6/8), at the concrete dam face adjacent to the respective joints. At the request of MDC, additional sampling closer to the joint was not undertaken. The remaining sampling showed the following:

- Concrete samples obtained from the cutwater concrete surface adjacent to the joint between blocks 3 and 5 demonstrated greater than 1 ppm PCBs in samples from the concrete surface to ½-inch depth at 1 inch, 3 inches and 6 inches from the seam. At each location, PCBs were not detected in the ½ inch to 1 inch deep samples.

- Concrete samples obtained from the cutwater concrete surface adjacent to the joint between blocks 6 and 8 demonstrated greater than 1 ppm PCBs in samples from the concrete surface to ½ inch depth at 1 inch, 3 inches, 6 inches and 12 inches from the seam. At the 1, 3 and 6 inch locations, PCBs were not detected above 1 ppm in the ½ inch to 1 inch deep samples; however, no ½ inch to 1 inch deep sample was obtained at the 12 inch location.

Table 2 provides a graphical representation of the analytical results for these two areas. These results suggest that PCB impacts along the cutwaters are limited to shallow concrete along the face of both cutwaters.

## 2.50 REMOTE OPERATED VEHICLE INSPECTION

In order to further assess the extent of caulk beneath the reservoir surface, GZA personnel conducted a Remote Operated Vehicle (ROV) assessment on May 13, 2011. Based on information provided by MDC and on field observations conducted from the water surface, the impacted caulk seams span from approximately elevation 490 down to elevation 479.5 (Old Reservoir Datum); however, a portion of the caulk at the 3/5 and 6/8 joints is underwater, and the lower extent was not directly observed. The assessment focused on the underwater extent of caulk at these joints. Observations were made using a small ROV equipped with a camera. At each joint, the ROV observed the joint from the reservoir surface to a depth of approximately 36 feet. At the 3/5 joint, the caulk was observed to extend to approximately elevation 477; while at the 6/8 joint, the caulk was observed to extend to approximately elevation 475. For the purposes of the proposed abatement, GZA

has assumed that both caulk seams formerly extended to elevation 475, or approximately 10 feet below the spillway elevation.

## 2.60 HISTORIC DOCUMENTATION

Historic information provided by MDC concerning prior rehabilitation projects at the Nepaug Dam indicates that sections of the upstream face of the Nepaug Dam were resurfaced in 1974 and 1980. A full resurfacing of the upstream face of the dam was previously conducted in 1959, and it is during this event that the PCB-containing caulk appears to have been installed. Information provided by MDC indicates the following:

1959 – Almost the entire upstream face of the dam (elevation 498.5 feet down to elevation 480 feet), including the spillway section and cutwaters were resurfaced and caulk was replaced. Concrete and gunite were replaced on the dam face to depths between 1.5 and 5 inches, and contract drawings indicate new caulk compound (1 to 1.5 inches thick) was placed in each contraction joint.

1974 – The upper portion of the dam face (elevation 498.5 feet down to elevation 490 feet) was resurfaced as part of repairs to the bridge parapet. This included the entire spillway span. A minimum of 6 inches to more than 1 foot of concrete was removed and replaced on the upstream face of the dam. These depths are significantly greater than the depth of PCB-impacted concrete observed during the current study, and concrete in this section that may have been impacted by potentially PCB-containing caulk is no longer present. Caulk was not reinstalled in this section of the dam. This is supported by field observations which indicated that no caulk was observed in the joints above elevation 490 during the current investigations. No work was done on the upstream face of the dam in the area where PCB-contaminated caulk has been identified (elevation 490 feet down to elevation 475 feet) during this period.

1980 – The remaining, lower portion of the dam face (elevation 490 feet down to elevation 479.5 feet) was resurfaced and caulk was replaced. Resurfacing consisted of removing 9 inches or more of gunite and unsound concrete until reasonably sound concrete was identified. Block 13 and the cutwaters were not resurfaced during this work. Some caulk was removed from joints 11/13 and joints 3\5 and 6\8 which are between the upstream dam face and the cutwater structures on either side of the spillway. The caulk removed was abutting the blocks that were resurfaced (blocks 11, 5 and 8, respectively). New caulk replaced the caulk removed. Caulk from 1959 remained in these three joints, abutting block 13 and the two cutwaters adjacent to joints 3/5 and 6/8.

The original conceptual site model assumed that the PCB containing caulk observed at the dam had been installed in 1974; however, review of the rehabilitation information provided by MDC, along with the results of the analytical data discussed above, indicates that the PCB containing caulk was most likely installed during the previous 1959 event. Information supplied by MDC concerning the 1974 event indicated that the work was limited to the upper portion of the dam where caulk has not been observed, and that no caulk was installed during this event.

A figure showing the extent of resurfacing activities in 1974 and 1980 is included as part of Appendix D.

## 2.70 SUMMARY OF PCB IMPACTS

Samples of caulk from joints between each of the blocks on the upstream surface of the dam have been obtained, along with samples of caulk from the spillway retaining wall-lower gate house, the west retaining wall of the spillway pool and discharge channel , and the bridge deck, and samples of caulk and paint from the upper gate house. Laboratory analyses indicate that only the joints between blocks 3/5, 6/8 and 11/13 contain PCB-contaminated caulk greater than one ppm. The three locations exhibiting PCBs are within the limited area below elevation 490 that were not resurfaced during the 1980 rehabilitation project. The extent of the caulk below the reservoir water surface was established based on results of GZA's ROV inspection. As the normal pool/spillway crest elevation is 485, and the caulk has been observed to extend approximately 10 feet underwater, abatement will extend from elevation 490 down to elevation 475. Depending on the water surface elevation, the 11/13 joint may be completely above water level in the reservoir. GZA anticipates that MDC will be able to lower the level of the Nepaug Reservoir during abatement work, allowing access to more of the caulk; however, it is unlikely that the entire caulk seam at joints 3/5 and 6/8 will be accessible and alternative measures (coffer dam, etc.) will be required to access these areas. Analytical data and observations of conditions at the dam suggest that the gray caulk appears to be the source of PCB impacts at the dam. PCB concentrations detected in the other caulk samples may have resulted from the migration of PCB from the gray caulk over the intervening years.

Although additional sampling of surface water adjacent to the caulk seam between blocks 6 and 8 was recommended by MDC as part of their supplemental sampling memorandum, a review of laboratory analytical results indicated it was not necessary. The surface water sample was obtained from adjacent to the caulk seam which exhibited the highest concentration of PCBs (joint 11\13). Analysis of the surface water sample did not indicate the presence of PCBs in water above the laboratory detection limit. As a result, further surface water sampling was not conducted.

Analytical results from samples obtained from the concrete blocks adjacent to the three PCB caulk seams indicate varying distances and depths of PCB migration, which are generally limited to within several inches of the seam. However, along the curved face of both cutwaters, shallow concrete (less than 1 inch deep) has been impacted at a distance of at least 12 inches from the caulk seam. The cutwater shot-crete face appears to be more porous than the dam blocks, which are high strength cyclopean concrete. Also, a visual inspection of the cutwaters has shown they have weathered to a greater extent than the areas of the dam face resurfaced in 1980 (see photos 3, 4 and 8 in Appendix B). These conditions may contribute to the greater extent of PCB migration observed.

Review of the analytical data indicates that certain samples had detection limits greater than 1 ppm. At most locations, the elevated detection limits were the result of the presence of elevated concentrations of PCBs which will be removed as part of the planned abatement program. However, some of the caulk samples and the foam and tar samples, were reported as non-detect (ND) with elevated detection limits and are identified as materials to be left in place. These samples include: 082109 Caulk 5-7, 082109 Caulk 7-9, 082109 Caulk 9-11, 082109 Caulk 8-10, 082109 Foam 9-11, 092109 Tar 9-11 and Gatehouse East Vertical. The elevated detection limits appear to be due to a lack of a

clearly defined detection limit during the 2009 sampling events and dilution of the Gatehouse East Vertical sample required by the sample matrix. These materials are all located within the area addressed during the 1980 renovation work during which the PCB containing caulk and a substantial depth of concrete were removed. The concrete depth removed during the 1980 renovation exceeds the depth where PCB impacts have been observed during our assessment. Additionally, for samples 082109 Caulk 7-9, 082109 Caulk 9-11, 082109 Caulk 8-10 and Gatehouse East Vertical, alternate samples of caulk have been obtained from the same locations. The analytical results for these alternate samples have indicated that no PCBs were detected, and the detection limits were less than 1 ppm. Based on the historical information and the analytical results for the alternate samples, it can be concluded that PCBs are not present at these locations. Finally, for two concrete samples (3/5 Buttress 6-out (1/2-1) and 6/8 Buttress 6-out (1/2-1)), both of which were taken on the cutwaters, 6 inches from the caulk seam and at a depth of ½-inch to 1-inch, the detection limits were slightly above 1 ppm. All other samples from this depth interval on the cutwaters have indicated PCB concentrations less than 1 ppm, and these sampling points will be removed during the planned abatement, with post-removal confirmatory sampling to confirm achievement of the abatement goals.

## 2.80 OVERVIEW OF ABATEMENT GOALS

The overall goal of the abatement activities of this work plan is to accomplish complete removal of the source of PCBs at the Nepaug Dam and to achieve the appropriate acceptance criteria for impacted materials and surfaces.

The source removal and abatement activities will be conducted to achieve compliance with USEPA TSCA requirements and to protect both public health and the environment. PCB bulk product waste and PCB remediation waste will be removed, handled, transported, and disposed of in compliance with federal and state regulatory requirements.

The Nepaug Dam, based on current and anticipated future activities, readily meets the definition at 40 CFR 761.3 of a Low Occupancy area. The anticipated maximum cumulative personnel presence for one worker on the deck would not exceed 24-hours per year. However, because of the proximity of the drinking water supply, exposed and accessible materials and surfaces at the dam will be abated to the acceptance criteria of 1 ppm PCBs. PCB-containing caulk will be removed at the block 3/5, 6/8 and 11/13 joints between elevation 490 and 475, and concrete in contact with the PCB-containing caulk will be removed as follows:

- Block 11: Remove concrete to a distance of at least 1 inch from the caulk seam between blocks 11 and 13, to a depth of at least 1 inch.
- Block 13: Remove concrete to a distance of at least 2 inches from the caulk seam between blocks 11 and 13, to a depth of at least 1 inch.
- Block 5: Remove concrete to a distance of at least 1 inch from the caulk seam between blocks 3 and 5, to a depth of at least 1 inch.

- Cutwater at block 3/5: Remove concrete to a distance of at least 12 inches from the caulk seam between blocks 3 and 5, to a depth of at least 1 inch.

- Block 8: Remove concrete to a distance of at least 1 inch from the caulk seam between blocks 6 and 8, to a depth of at least 1 inch.

- Cutwater at block 6/8: Remove concrete to a distance of at least 18 inches from the caulk seam between blocks 6 and 8, to a depth of at least 1 inch.

The restoration work to be conducted as part of the abatement project, as discussed further in Section 12.00 below will include restoring the concrete surfaces to serviceable condition.

## 3.00 REGULATIONS, PERMITS AND QUALIFICATIONS

The contractor selected by MDC to abate the specified PCB-impacted surfaces at the Nepaug Dam will be responsible for obtaining permits necessary to execute the abatement work. The contractor will be responsible for adhering to applicable federal, state, and local laws and regulations and notifications.

### 3.10 STANDARD OPERATING PROCEDURES

MDC will require that the contractor prepare a written Contractor's Abatement Work Plan to supplement this plan. Additionally, the contractor will be required to prepare a Health and Safety Plan (HASP). The plans must ensure maximum protection of workers, visitors, employees, the water supply, the community, and the environment from PCB exposure and must prevent the release of PCBs in any form into the environment. The Contractor's Abatement Work Plan and HASP will be required to address each of the following items:

- A detailed description of the means and methods of installing, maintaining, and verifying engineering controls and work practices to minimize the generation and prevent the release of contamination from the work area. In addition, a detailed description must be provided regarding the proposed method of removing PCB-containing caulk and PCB-impacted concrete from below the reservoir water surface. The controls and practices to be instituted during abatement activities must keep worker exposure to PCBs below the OSHA permissible exposure limit and ensure no release of PCBs from the work area to the surrounding area, to the water supply, or to the general environment;

- A detailed description of the means and methods of establishing, maintaining, and verifying the containment, or approved alternate method to prevent the release of emissions from the work area;

- A description of planned or required personnel protection equipment (PPE) including protective clothing, respiratory protection equipment, and others, as may be required by OSHA regulations;

- A description of the minimum requirements for safe work practices in the workplace, including exclusion of eating, drinking, and smoking: tool decontamination practices; and PPE management requirements;

- A description of requirements for end of work shift decontamination and cleaning procedures;

- A description of the procedures to be followed for the handling, storage, transport, and disposal of appropriately classified PCB waste in a manner that minimizes exposure and that complies with federal, state, and local regulations regarding PCBs;

- The identification of primary and alternate disposal sites for PCB waste; and

- Contingency plans to address the potential for accidental spills and/or contamination in the work area or outside the work area.

### 3.20 TRAINING AND CERTIFICATION

Personnel performing abatement activities at the Nepaug Dam will be required to have had training, medical examinations, and respirator fit testing (if respirator use is required) as specified by OSHA. The contractor will be required to have a competent person at the job site at all times that work is ongoing. Site-specific hazards and hazards associated with the handling and disposal of PCB products must be effectively communicated to all workers to minimize potential exposures. Completion of a Hazard Communication program in conformance with the elements of 29 CFR 1926.59 is required. In addition, the contractor must provide proper training and equipment for all safety-related issues. Additional health and safety requirements are presented in Section 13.00.

## 4.00 SCOPE AND SCHEDULE

The overall goal of the abatement activities of this work plan is to achieve the appropriate acceptance criteria for the Nepaug Dam surfaces impacted by PCBs.

The abatement activities will be conducted to achieve compliance with USEPA TSCA requirements and to protect both public health and the environment. PCB bulk product and remediation waste will be removed, handled, transported, and disposed of in compliance with federal and state regulatory requirements.

### 4.10 SCOPE OF ABATEMENT

The abatement scope of work for the Nepaug Dam addresses the removal of identified PCB-containing caulk and PCB-contaminated concrete adjacent to the caulk. The work will consist of the following general elements:

- Site isolation and protection.

- Source containment and removal.
- Material disposal.
- Decontamination and/or removal of PCB residues.
- Acceptance testing and verification.
- Site restoration.

Specific abatement items are as follows:

1. Removal and disposal of PCB-containing caulk from the block 3/5, 6/8 and 11/13 joints between elevations 490 and 475; and

2. Removal and disposal of concrete as follows:

   a) Block 11: Remove concrete to a distance of at least 1 inch from the caulk seam between blocks 11 and 13, to a depth of at least 1 inch;

   b) Block 13: Remove concrete to a distance of at least 2 inches from the caulk seam between blocks 11 and 13, to a depth of at least 1 inch;

   c) Block 5: Remove concrete to a distance of at least 1 inch from the caulk seam between blocks 3 and 5, to a depth of at least 1 inch;

   d) Cutwater at block 3/5: Remove concrete to a distance of at least 12 inches from the caulk seam between blocks 3 and 5, to a depth of at least 1 inch;

   e) Block 8: Remove concrete to a distance of at least 1 inch from the caulk seam between blocks 6 and 8, to a depth of at least 1 inch; and

   f) Cutwater at block 6/8: Remove concrete to a distance of at least 18 inches from the caulk seam between blocks 6 and 8, to a depth of at least 1 inch.

The abatement contractor will supply all labor, materials, and equipment necessary to carry out the scope of work detailed in this document in a professional, workman-like manner. Final acceptance of the work is predicated on obtaining successful testing and inspection results (see Section 10.00 and 11.00) and completing site restoration activities (see Section 12.00). As summarized in Section 3.10, the abatement contractor shall be required to submit a Contractor's Abatement Work Plan to MDC detailing its planned abatement activities at the Nepaug Dam. The plan must include, at a minimum, a description of the removal activities, engineering controls, decontamination activities, and reporting; and will be subject to review and approval by USEPA prior to initiation of work.

4.20 SCHEDULE

Work shall be performed within MDC's allocated time period for abatement activities. The contractor will be required to complete the work in accordance with the schedule requirements of the contract.

## 5.00 IMPACTED MATERIAL QUANTITIES

Impacted caulk includes caulk in the joints between blocks 3/5, 6/8 and 11/13. The vertical caulk seams at the 3/5 and 6/8 joints span from approximately elevation 490 down to elevation 475; and the caulk seam at the 11/13 joint spans from approximately elevation 490 down to elevation 479.5; resulting in approximately 40 linear feet of PCB-containing caulk. Removal of concrete from the specified distance adjacent to these caulk seams will result in the generation of less than 1 cubic yard of concrete.

## 6.00 SITE PREPARATION, CONTAINMENT, AND ISOLATION

This section provides a general description of the site preparation and containment requirements for the abatement project. The means and methods of accomplishing these requirements will be determined by the selected abatement contractor and will be detailed in the Contractor's Abatement Work Plan.

### 6.10 NEPAUG DAM ABATEMENT

In order to protect the Nepaug Reservoir, and to prevent the potential release of PCB-impacted material or debris from the work area; PCB abatement will be conducted under full containment or utilizing an alternate localized containment method proposed by the contractor and accepted by MDC and USEPA, that has been demonstrated to positively preclude the release of any emissions resulting from the abatement work. MDC personnel have indicated that the operating elevation of the reservoir is elevation 385, resulting in approximately 5.5 feet of caulk that may be potentially below the water line at the 3/5 and 6/8 joints. The MDC will make an attempt to temporarily lower the reservoir pool by about 7 feet during the work, so that much of the abatement can be accomplished in-the-dry. However, as the lower water level cannot be assured and the caulk seams at the 3/5 and 6/8 joints extend to approximately elevation 475, portions of the PCB-containing caulk will be located below the water surface, and the abatement of the PCB impacts in these two areas will require the Contractor to erect temporary enclosures to allow for abatement of PCBs impacts in these areas to be conducted without risk of impact to the reservoir.

The contractor will be required to fully establish the work area containment or approved suitable alternative prior to initiating any work that will disturb PCB-impacted materials. Once the containment is in place, the abatement work may commence.

Caulk disturbance and removal activities must be accompanied by rigorous HEPA vacuum collection before, during, and after removal. Removed caulk must be placed directly in 6-mil plastic bag lined buckets. Prior to its removal from the containment or from the immediate work area for delivery to the PCB container, PCB bulk waste must be double bagged, securely sealed and appropriately labeled.

Caulk removal will be conducted with appropriate tools and sufficient effort to leave only strongly adhering residue on the concrete surface. At the completion of bulk caulk

removal activities, porous concrete surfaces will be removed, scarified, or ground as provided below.

6.20 WASTE CONTAINMENT

The use of containers will be required for short term on-site storage and off-site transport of remediation waste. However, the abatement Contractor's Abatement Work Plan will provide final details. Containers will be lined, covered and secured. Container location will be subject to approval by MDC. PCB waste containers will be placarded on all sides as containing PCB waste with markings meeting the requirements of 40 CFR 761.45. Containers will be maintained, secured, and covered, except during active operation of loading waste. PCB remediation wastes will be stored in accordance with applicable USEPA TSCA regulations.

## 7.00 ABATEMENT PROCEDURES

Contractors must obtain proper permits and conduct work in compliance with applicable regulations, including TSCA, RCRA, and any other applicable federal, state, and local laws and regulations. Abatement procedures for the work consist of the removal of identified PCB-containing materials.

7.10 BULK CAULK REMOVAL

Caulk disturbance and removal activities must be accompanied by rigorous HEPA vacuum collection before, during, and after removal. Removed caulk must be placed directly in 6-mil plastic bag lined buckets. Prior to its removal from the containment or from the immediate work area for delivery to the PCB container, PCB bulk waste must be double bagged, securely sealed and appropriately labeled.

Caulk removal will be conducted with appropriate tools and sufficient effort to leave only strongly adhering residue on the concrete surface.

At the completion of bulk caulk removal activities, concrete contact surfaces will be removed as provided below.

7.20 CONCRETE SURFACE ABATEMENT

After bulk caulk removal has been concluded, concrete identified as containing greater than 1 ppm PCBs will be removed. Concrete will be cut or otherwise broken to yield concrete pieces of manageable size and weight for removal, transport, and disposal. The dust and debris generated by these processes will be continuously collected by an integrated dust collection system fitted with HEPA filtration. Removed concrete will be loaded into a lined gondola or similar transport container within the containment and securely covered before removal from the containment.

Concrete cutting, breaking, abrading, or scarifying that occurs on the Nepaug Dam must be conducted within the negative pressure containment or other approved containment system

proposed in the Contractor's Abatement Work Plan. If water is used in conjunction with concrete cutting and to control dust within the containment it must be kept to a minimum quantity and be controlled and captured through the use of water dams and wet-vacs. No release or discharge of water will be allowed. Captured cutting or dust-control water must be contained, sampled, analyzed and properly disposed of off-site.

Following completion of abatement at each work area and removal of material from the containment, a complete cleaning of the containment area including HEPA vacuuming of surfaces and removal of debris is required prior to containment inspection and clearance for dismantling or relocation.

## 8.00 PCB MATERIAL MANAGEMENT

In addition to the work area containment provisions discussed above, the following minimum requirements will be followed for abatement work and waste material handling. The actual means and methods and final details of waste management, segregation, handling, and securing will be provided, for approval by USEPA and MDC, in the Contractor's Abatement Work Plan.

### 8.10 PCB BULK PRODUCT WASTE MATERIALS

Caulk, classified as PCB bulk product waste, will be removed from Nepaug Dam in a manner that will avoid the generation of dust and debris. Caulk removal activities will be accompanied by the application of HEPA vacuum collection to capture any dust or debris created or released by the removal activity. Once removed, these materials shall be place into a lined temporary container for transport to the PCB container. Buckets fitted with 6-mil plastic bag liners, or similar containers as identified in the Contractor's Abatement Work Plan, will be used as temporary containers for removed caulk. When each bucket is filled to approximately 80 percent of capacity, the plastic liner will be securely tied, removed from the bucket and placed within a larger (35- to 50-gallon) 6-mil plastic bag lined barrel within the containment work area. Prior to removal of accumulated PCB waste from the containment work area, the wastes will be required to be securely double bagged and labeled in accordance with 40 CFR 761.40.

Caulk, adjacent concrete within 1 inch of a caulk seam, and dust and debris associated with these abatement activities will be designated as PCB bulk waste. PCB bulk product wastes generated during the work of this Abatement Work Plan will be disposed of at a TSCA permitted landfill.

### 8.20 PCB REMEDIATION WASTE

The primary PCB remediation wastes generated by this abatement project will be concrete and contaminated dust and/or debris generated during removal of concrete surfaces more than 1 inch from a caulk seam.

Other PCB remediation wastes that will be generated during this project include disposable materials from the cleaning of non-porous surfaces, such as spent scraper blades and rags,

which will be collected in lined buckets as described above for the bulk waste. Any liquids, such as water generated during cutting or scarifying of concrete or during decontamination of tools, will be collected, contained, and analyzed for appropriate disposal. At the end of each work shift, PCB waste will be removed from the containment work area and secured in the PCB waste container. PCB bulk product waste and PCB remediation waste items will be stored for disposal in accordance with 40 CFR 761.40 and 761.65. PCB remediation wastes generated during the work of this Abatement Work Plan may be disposed of at an appropriately permitted lined Subtitle D landfill. Alternatively, given the limited quantity of PCB remediation waste anticipated, to avoid the segregation and management requirements, the Contractor may choose to dispose of all wastes as PCB bulk waste.

## 9.00 WASTE DISPOSAL

Disposal of all waste shall be in accordance with applicable state and federal regulations at licensed facilities that will receive and retain PCB bulk product waste and PCB remediation waste, in accordance with USEPA regulations under 40 CFR 761.61 and 761.62. All PCB bulk product waste and PCB remediation waste will be kept separate from other ordinary construction waste streams that the contractor may generate. Sally Keating or her designee will be responsible for reviewing and signing all necessary shipping papers that designate MDC as the waste generator. Copies of all bills of lading, waste shipment records, manifests, certificates of disposal, and other documentation will be provided by the abatement contractor to MDC as proof of proper waste disposal. Copies of all manifests shall be provided to the USEPA as part of the final summary report.

PCB bulk product and PCB remediation wastes will be stored in accordance with applicable USEPA TSCA regulations. The contractor will ensure compliance with storage and labeling requirements described in 40 CFR 761.40 and 761.65. All PCB bulk waste and PCB remediation wastes will be double bagged as described above prior to transfer into the lined PCB waste containers.

The PCB bulk product waste and PCB remediation waste shall be disposed of in accordance with 40 CFR 761.61 and761.62, respectively, at landfill(s) approved for such disposal. The name of the landfill(s), along with appropriate documentation to verify that it is capable of accepting PCB waste in accordance with these requirements, will be submitted to USEPA as part of the Contractor's Abatement Work Plan.

## 10.00 ABATEMENT VERIFICATION AND ACCEPTANCE

Verification will be conducted to demonstrate that the appropriate acceptance criteria for each material and location have been met. The abatement contractor will be required to retain the services of an independent testing laboratory to collect and analyze samples of the materials at the frequencies specified below. The laboratory must be certified by the Connecticut Department of Public Health. Analyses to verify achievement of 1 ppm

acceptance criteria will be conducted using USEPA approved methods for extraction and analyses of PCBs. The approved methods required to be utilized are Method 3540C Manual Soxhlet Extraction followed by Method 8082 PCB analysis. Laboratory detection limits will be required to be 0.5 ppm or less (half the acceptance criteria (1 ppm) for each sample type). Quality assurance/quality control (QA/QC) sampling will be required in accordance with Section 11.00.

10.10 VERIFICATION SAMPLING AND ANALYSES

As described above, approximately 40 linear feet of PCB-containing caulk has been identified, with each caulk seam contacting two adjoining concrete blocks. Subsequent to removal of the caulk and impacted concrete, verification sampling will be required to ensure that residual PCB concentrations in the remaining concrete are less than 1 ppm. At blocks 5, 8, 11 and 13, where a limited (2 inches or less and to a depth of 1 inch) section of concrete is to be removed, confirmatory sampling will be conducted at an interval of 1 per 5 linear feet, resulting in collection of a minimum 8 samples total. For the two cutwaters, where more distant concrete removal is required (12 and 18 inches respectively, to a depth of 1 inch) confirmatory sampling will be conducted at an interval of 1 per 5 square feet, resulting in collection of a minimum of 8 samples total.

10.20 CONTINGENT ABATEMENT AND RESAMPLING

Results of verification samples are anticipated to demonstrate that abated surfaces meet the specified acceptance criteria. In the event that analytical results indicate an exceedance of the acceptance criteria, additional concrete will be removed in the area represented by the failed sample, and additional verification samples will be collected at the specified initial frequencies.

## 11.00 QUALITY ASSURANCE/QUALITY CONTROL

The quality assurance objectives, and the measurement and performance criteria established for this project are discussed below. The analytical laboratory and the analytical methods to be utilized will be required to provide quantitation limits of 0.5 ppm or less. Table 3 presents a summary of the data quality criteria and measurement frequency for this abatement project.

The ultimate objective of this project is to remove PCB impacted materials as specified in this plan. The data collected as part of this project must be of sufficient quality to support a conclusion that the remaining Nepaug Dam surfaces meet the acceptance criteria.

Data quality objectives will be measured using several criteria, including precision, accuracy, representativeness, comparability, completeness, and sensitivity parameters. Laboratory and field sampling documentation will be used to assess these parameters.

## 11.10 PRECISION

Precision is the degree of agreement among repeated measurements of the same characteristic under the same or similar conditions. One duplicate sample will be collected per every sample group collected or 10% of the sample set. No less than one duplicate will be collected, regardless of the number of samples. The identity of duplicate samples will not be revealed to the analytical laboratory. The target precision for field duplicates is ± 45%, indicating good reproducibility. Because of the anticipated low concentrations of PCBs in the verification samples, a precision of 45% will be an acceptable indicator for reproducibility. Precision levels outside of the 45% acceptance criteria will not invalidate the sample data set, but will be flagged to caution users about variability within the data. Matrix spike/matrix spike duplicate is also a measure of precision and will be assigned at a frequency of one pair per 20 field samples of like matrix.

## 11.20 ACCURACY

Accuracy is the extent of agreement between an observed value (sample result) and the accepted or true value of the parameter being measured. The submittal of one field or equipment blank for each sample group will be required. The appropriate laboratory QC program and analytical method will determine acceptable recoveries. The laboratory will utilize matrix spiked samples; laboratory control samples, blanks, and surrogates to assure accuracy. Recoveries outside the acceptable limits will not invalidate the sample data set; however, the data will be flagged to warn of its reliability.

## 11.30 REPRESENTATIVENESS

Representativeness is a qualitative term that describes the extent to which a sampling design adequately reflects the environmental conditions of a site. The samples will be selected to represent the various field conditions and the materials and locations that have been abated.

## 11.40 REASONABLENESS

Data will be evaluated for reasonableness based on existing knowledge of source location and contaminant distribution in the project areas. The verification samples are anticipated to verify achievement of the acceptance criteria. Any data that falls substantially outside these expected levels will be further evaluated for accuracy and additional data collection may be required.

## 11.50 COMPLETENESS

Completeness is a measure (percentage) of the amount of valid data obtained meeting the data quality objectives. Valid data are data that meet the data quality indicators. The acceptable completeness percentage for this project is 90 percent.

## 12.00 FACILITY RESTORATION

Following completion of abatement work, including verification of the achievement of the appropriate acceptance criteria for each material at each location discussed in Section 10.00, the project locations will be restored to serve their intended functions.

## 13.00 ABATEMENT CONTRACTOR'S HEALTH AND SAFETY PLAN

The abatement contractor will be required to submit a written HASP that details engineering controls, practices and procedures, protective equipment, and training that will be used to control and minimize exposures. In addition, the plan will include provisions for relevant health and safety issues.

The safety plan shall include copies of training materials and training records for those who will be working on-site at any time during the abatement project. If new employees are hired during the course of the work, they must receive training prior to working on-site and evidence of this training must be provided to the project team.

Applicable federal and state OSHA standards and regulations to insure worker safety will be enforced during the abatement process. The following list represents some, but not necessarily all, of the items that must be addressed in the contractor's HASP. The contractor is responsible for determining which items apply and how best to implement them.

1. Safety and health hazard assessment;
2. Site access and accountability including sign-in and sign-out procedures;
3. Procedures for emergency medical treatment and on site first aid;
4. Map indicating route to hospital for emergency medical treatment;
5. List of emergency contacts including home and cell phone numbers;
6. Physical hazard evaluation and abatement including the following:
    - Respiratory Protection
    - Fall Protection
    - Emergency water retrieval (man overboard) kit
    - Personal Protective Equipment
    - Lockout/Tagout
    - Machine Safety/ Equipment Operation
    - Ladder/Scaffolding Safety
    - Electrical Safety
    - Housekeeping (slips, trips, falls)
    - Injury Reporting
    - First Aid
    - Fire Safety
    - Cold and Heat Stress
    - Confined Space Entry

7. Copies of Material Safety Data Sheets for all chemicals to be used for this project;
8. Recordkeeping requirements including injury and accident report forms.

13.10 PUBLIC SAFETY

The abatement work for this project will occur in close proximity to an active drinking water supply system. The contractor will be required to demonstrate how his proposed Contractor's Abatement Work Plan and all the elements thereof will ensure public safety during all phases of the abatement work. Contractor will be required to implement containment measures designed to protect workers, occupants, the water supply and the environment from the release or emission of PCB-containing materials in any form.

Proper control, hygiene, and decontamination procedures must be followed to prevent the release of PCBs in any form into the environment.

## 14.00 FINAL APPROVAL AND ACCEPTANCE

Final approval and acceptance of the abatement work will depend on the following conditions being met:

- The specified removal and abatement has been completed and demonstrated by successful laboratory analyses as described in Section 10.00.
- The results of verification sampling meet the standards specified in Sections 10.00 and 11.00
- The site has been restored.
- Any additional conditions imposed on abatement work by USEPA have been met.
- A complete and accurate compilation of waste manifests for the waste removed from the site has been received and reconciled.

Table 1
PCB Sampling Results
Nepaug Dam

All results in parts per million (ppm)

| Location | Sample Name | Matrix | Sampling Notes | Sampling Date | PCB Aroclors 1016 | 1221 | 1232 | 1242 | 1248 | 1254 | 1260 | 1262 | 1268 | Total PCBs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3/5 Joint | PCB4.BETWEEN 5&3 | Caulk | | 10/23/08 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | ND |
| | 3/5 BUTTRESS, EAST | Caulk | Gray caulk | 7/21/10 | <27300 | <27300 | <27300 | <27300 | <18200 | <27300 | 238000 | <9090 | <9090 | 238000 |
| | 1"OUT,0"-1/2,"EAST 3/5 SPAN | Concrete | Dam side of 3/5 joint | 8/11/10 | <0.0604 | <0.0604 | <0.0604 | <0.0604 | <0.0403 | <0.0604 | 0.877 | <0.0201 | <0.0201 | 0.877 |
| | 1"OUT, 1/2"-1", EAST, 3/5 SPAN | Concrete | Dam side of 3/5 joint | 8/11/10 | <0.324 | <0.324 | <0.324 | <0.324 | <0.216 | <0.324 | 0.305 | <0.108 | <0.108 | 0.305 |
| | 3/5 BUTTRESS 1" OUT(0-1/2) | Concrete | Buttress side of 3/5 joint | 10/20/10 | <2.35 | <2.35 | <2.35 | <2.35 | <1.57 | <2.35 | 21.9 | <0.783 | <0.783 | 21.9 |
| | 3/5 BUTTRESS 1" OUT(1/2-1) | Concrete | Buttress side of 3/5 joint | 10/20/10 | <0.409 | <3.409 | <0.409 | <0.409 | <0.272 | <0.409 | <0.272 | <0.136 | <0.136 | ND |
| | 3/5 BUTTRESS 3-OUT (0-1/2) | Concrete | Buttress side of 3/5 joint | 10/20/10 | <0.306 | <0.306 | <0.306 | <0.306 | <0.204 | <0.306 | 1.65 | <0.102 | <0.102 | 1.65 |
| | 3/5 BUTTRESS 3-OUT (1/2-1) | Concrete | Buttress side of 3/5 joint | 10/20/10 | <0.723 | <0.723 | <0.723 | <0.723 | <0.482 | <0.723 | <0.482 | <0.241 | <0.241 | ND |
| | 3/5 BUTTRESS 6-OUT (0-1/2) | Concrete | Buttress side of 3/5 joint | 10/20/10 | <0.998 | <0.998 | <0.998 | <0.998 | <0.665 | <0.998 | 2.18 | <0.332 | <0.332 | 2.18 |
| | 3/5 BUTTRESS 6-OUT (1/2-1) | Concrete | Buttress side of 3/5 joint | 10/20/10 | <1.18 | <1.18 | <1.18 | <1.18 | <0.786 | <1.18 | <0.786 | <0.393 | <0.393 | ND |
| | 3/5 BUTTRESS 12-OUT (0-1/2) | Concrete | Buttress side of 3/5 joint | 10/20/10 | <0.263 | <0.263 | <0.263 | <0.263 | <0.176 | <0.263 | <0.176 | <0.0878 | <0.0878 | ND |
| 5/7 Joint | 082109 CAULK 5-7 | Caulk | | 8/21/09 | <1.7 | <1.7 | <1.7 | <1.7 | <1.7 | <1.7 | <1.7 | <1.7 | <1.7 | ND |
| 6/8 Joint | 082109 CAULK 4-6 | Caulk | Sample mislabeled as 4/6 | 8/21/09 | <17 | <17 | <17 | <17 | <17 | <17 | 66 | <17 | <17 | 66 |
| | PCB5.BETWEEN 6&8 | Caulk | | 10/23/08 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | ND |
| | 6/8 BUTTRESS, WEST | Caulk | White caulk | 7/21/10 | <1.5 | <1.5 | <1.5 | <1.5 | <1 | <1.5 | 26.3 | <0.5 | <0.5 | 26.3 |
| | 6/8 BUTTRESS, WEST | Caulk | Gray caulk | 7/21/10 | <3220 | <3220 | <3220 | <3220 | <2150 | <3220 | 20500 | <1080 | <1080 | 20500 |
| | 1"OUT,0-1/2",WEST,6/8 SPAN | Concrete | Dam side of 6/8 joint | 8/11/10 | <0.59 | <0.59 | <0.59 | <0.59 | <0.393 | <0.59 | <0.393 | <0.196 | <0.196 | ND |
| | 1"OUT,1/2"-1",WEST,6/8 SPAN | Concrete | Dam side of 6/8 joint | 8/11/10 | <0.571 | <0.571 | <0.571 | <0.571 | <0.381 | <0.571 | <0.381 | <0.19 | <0.19 | ND |
| | 6/8 BUTTRESS 1" OUT(0-1/2) | Concrete | Buttress side of 6/8 joint | 10/20/10 | <0.29 | <0.29 | <0.29 | <0.29 | <0.194 | <0.29 | 2.3 | <0.0968 | <0.0968 | 2.3 |
| | 6/8 BUTTRESS 1" OUT(1/2-1) | Concrete | Buttress side of 6/8 joint | 10/20/10 | <0.0571 | <0.0571 | <0.0571 | <0.0571 | <0.0381 | <0.0571 | 0.672 | <0.019 | <0.019 | 0.672 |
| | 6/8 BUTRESS 3-OUT (0-1/2) | Concrete | Buttress side of 6/8 joint | 10/20/10 | <5.67 | <5.67 | <5.67 | <5.67 | <3.78 | <5.67 | 31.8 | <1.89 | <1.89 | 31.8 |
| | 6/8 BUTRESS 3-OUT (1/2-1) | Concrete | Buttress side of 6/8 joint | 10/20/10 | <0.43 | <0.43 | <0.43 | <0.43 | <0.287 | <0.43 | <0.287 | <0.143 | <0.143 | ND |
| | 6/8 BUTRESS 6-OUT (0-1/2) | Concrete | Buttress side of 6/8 joint | 10/20/10 | <0.701 | <0.701 | <0.701 | <0.701 | <0.467 | <0.701 | 1.08 | <0.234 | <0.234 | 1.08 |
| | 6/8 BUTTRESS 6-OUT (1/2-1) | Concrete | Buttress side of 6/8 joint | 10/20/10 | <2.87 | <2.87 | <2.87 | <2.87 | <1.91 | <2.87 | <1.91 | <0.957 | <0.957 | ND |
| | 6/8 BUTTRESS 12-OUT (0-1/2) | Concrete | Buttress side of 6/8 joint | 10/20/10 | <0.596 | <0.596 | <0.596 | <0.596 | <0.398 | <0.596 | 2.77 | <0.199 | <0.199 | 2.77 |
| 7/9 Joint | 082109 CAULK 7-9 | Caulk | | 8/21/09 | <1.7 | <1.7 | <1.7 | <1.7 | <1.7 | <1.7 | <1.7 | <1.7 | <1.7 | ND |
| | 7/9 SPAN | Caulk | White caulk | 7/21/10 | <0.232 | <0.232 | <0.232 | <0.232 | <0.155 | <0.232 | <0.155 | <0.0775 | <0.0775 | ND |
| 8/10 Joint | PCB3.BETWEEN 10&8 | Caulk | | 10/23/08 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | ND |
| | 8/10 SPAN | Caulk | White caulk | 7/21/10 | <0.12 | <0.12 | <0.12 | <0.12 | <0.08 | <0.12 | <0.08 | <0.04 | <0.04 | ND |
| 9/11 Joint | 082109 CAULK 9-11 | Caulk | | 8/21/09 | <1.7 | <1.7 | <1.7 | <1.7 | <1.7 | <1.7 | <1.7 | <1.7 | <1.7 | ND |
| | 082109 FOAM 9-11 | Foam | Backer behind caulk | 8/21/09 | <5.5 | <5.5 | <5.5 | <5.5 | <5.5 | <5.5 | <5.5 | <5.5 | <5.5 | ND |
| | 082109 TAR 9-11 | Tar | East side of joint below caulk | 8/21/09 | <15 | <15 | <15 | <15 | <15 | <15 | <15 | <15 | <15 | ND |
| | 082109 CONCRETE 9-11 | Concrete | Sampled just below caulk | 8/21/09 | <0.950 | <0.950 | <0.950 | <0.950 | <0.950 | <0.950 | <0.950 | <0.950 | <0.950 | ND |
| | PCB2.BETWEEN 9&7 | Caulk | Sample mislabeled as 9/7 | 10/23/08 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | ND |
| 10/12 Joint | 10/12 SPAN | Caulk | White caulk | 7/21/10 | <0.0626 | <0.0626 | <0.0626 | <0.0626 | <0.0418 | <0.0626 | <0.0418 | <0.0209 | <0.0209 | ND |
| | 082109 CAULK 8-10 | Caulk | Sample mislabeled as 8/10 | 8/21/09 | <1.7 | <1.7 | <1.7 | <1.7 | <1.7 | <1.7 | <1.7 | <1.7 | <1.7 | ND |
| 11/13 Joint | PCB1.BETWEEN 9&11 | Caulk | Samole mislabeled as 9/11 | 10/23/08 | <20 | <20 | <20 | <20 | <20 | <20 | 189 | <20 | <20 | 189 |
| | PCB1.BETWEEN 9&11 | Caulk | Re-analysis of sample | 10/23/08 | <12.5 | <12.5 | <12.5 | <12.5 | <12.5 | <12.5 | 138 | <12.5 | <12.5 | 138 |
| | 11-13 CAULK G | Caulk | Dark gray caulk | 9/11/09 | <83000 | <83000 | <83000 | <83000 | <83000 | <83000 | 240,000 | <83000 | <83000 | 240000 |
| | 11-13 CAULK W | Caulk | White caulk | 9/11/09 | <17 | <17 | <17 | <17 | <17 | <17 | 150 | <17 | <17 | 150 |
| | 11-13 CONCRETE S | Concrete | Directly beneath east side of | 9/11/09 | <2600 | <2600 | <2600 | <2600 | <2600 | <2600 | 4200 | <2600 | <2600 | 4200 |
| | 11-13 CONCRETE D | Concrete | 1.5" beneath east side of | 9/11/09 | <17 | <17 | <17 | <17 | <17 | <17 | 43 | <17 | <17 | 43 |
| | 1"OUT,0"-1/2", WEST,11/13 SPAN | Concrete | | 8/11/10 | <0.0549 | <0.0549 | <0.0549 | <0.0549 | <0.0366 | <0.0549 | 0.905 | <0.0183 | <0.0183 | 0.905 |
| | 1"OUT,1/2"-1",EAST, 11/13 SPAN | Concrete | | 8/11/10 | <0.0595 | <0.0595 | <0.0595 | <0.0595 | <0.0396 | <0.0595 | 0.0563 | <0.0198 | <0.0198 | 0.0563 |
| Upper Gate House | GATEHOUSE EAST VERTICAL | Caulk | | 7/21/10 | <4.2 | <4.2 | <4.2 | <4.2 | <2.8 | <4.2 | <2.8 | <1.4 | <1.4 | ND |
| | GATEHOUSE EXT. WINDOW | Caulk | | 7/21/10 | <0.106 | <0.106 | <0.106 | <0.106 | <0.0707 | <0.106 | <0.0707 | <0.0353 | <0.0353 | ND |
| | GATEHOUSE EXT. PAINT | Paint | | 7/21/10 | <0.2 | <0.2 | <0.2 | <0.2 | <0.133 | <0.2 | 0.213 | <0.0667 | <0.0667 | 0.213 |
| | PCB6.RIGHT GH CORNER | Caulk | | 10/23/08 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | ND |
| Retaining Wall | WEST RETAINING WALL A | Caulk | | 7/21/10 | <0.333 | <0.333 | <0.333 | <0.333 | 0.415 | <0.333 | 0.319 | <0.111 | <0.111 | 0.734 |
| | WEST RETAINING WALL B | Caulk | | 7/21/10 | <0.196 | <0.196 | <0.196 | <0.196 | <0.13 | 0.45 | 0.447 | <0.0652 | <0.0652 | 0.897 |
| | WEST RETAINING WALL C | Caulk | | 7/21/10 | <0.0568 | <0.0568 | <0.0568 | <0.0568 | <0.0379 | 0.157 | <0.0379 | <0.0189 | <0.0189 | 0.157 |
| Bridge Deck | PCB7.BRIDGE DECK | Caulk | | 10/23/08 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | ND |
| Spillway | PCB8.D/S RIGHT SPILLWAY | Caulk | | 10/23/08 | <0.7 | <0.7 | <0.7 | <0.7 | <0.7 | <0.7 | <0.7 | <0.7 | <0.7 | ND |

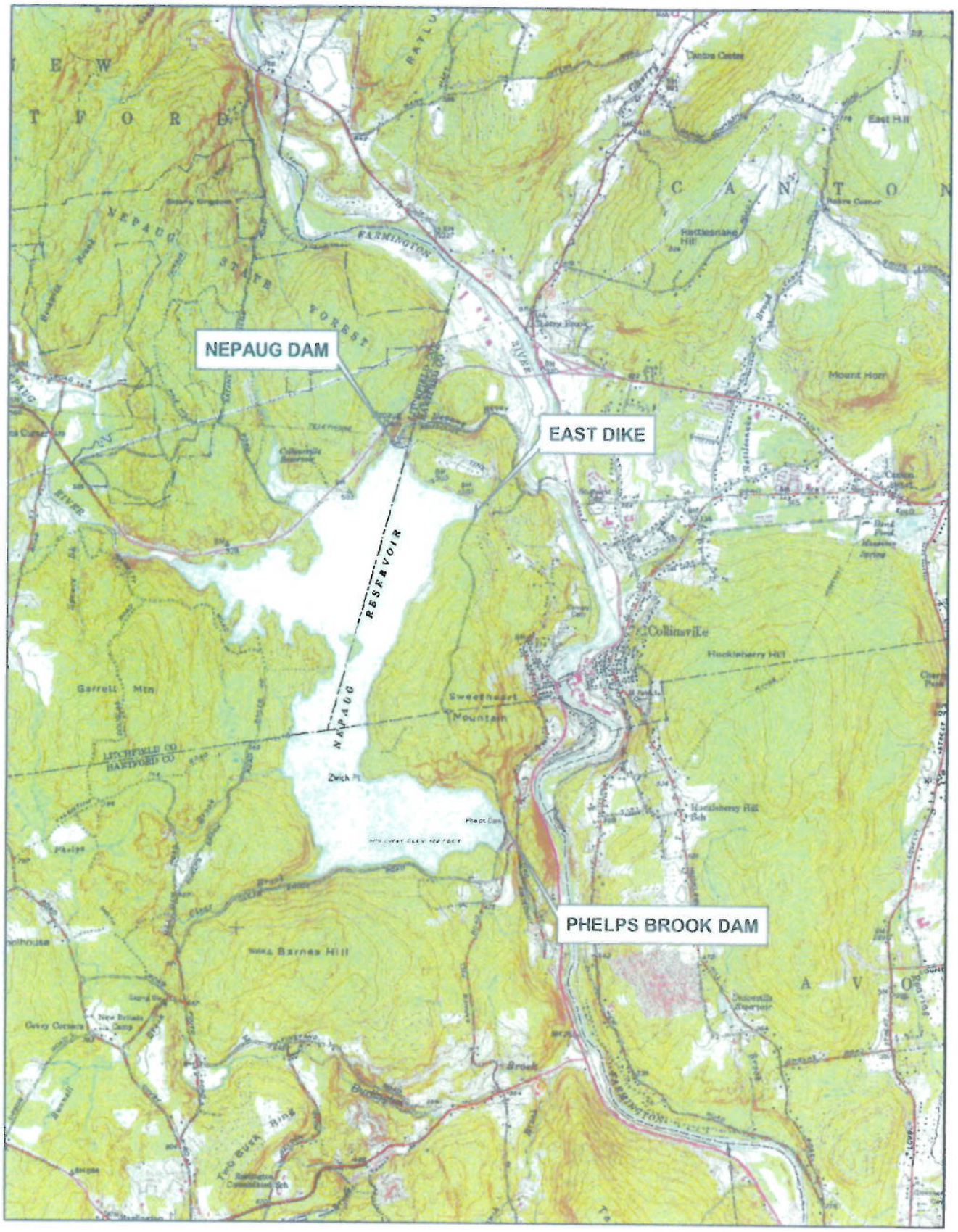
Table 2
PCB Results
Buttress Concrete Samples

| | | Distance | | | |
|---|---|---|---|---|---|
| | **Depth** | 1" | 3" | 6" | 12" |
| **3/5 Joint Buttress** | 0-1/2" | 21.9 | 1.65 | 2.18 | ND |
| | 1/2"-1" | ND | ND | ND | |
| | | 1" | 3" | 6" | 12" |
| **6/8 Joint Buttress** | 0-1/2" | 2.3 | 31.8 | 1.08 | 2.77 |
| | 1/2"-1" | 0.672 | ND | ND | |

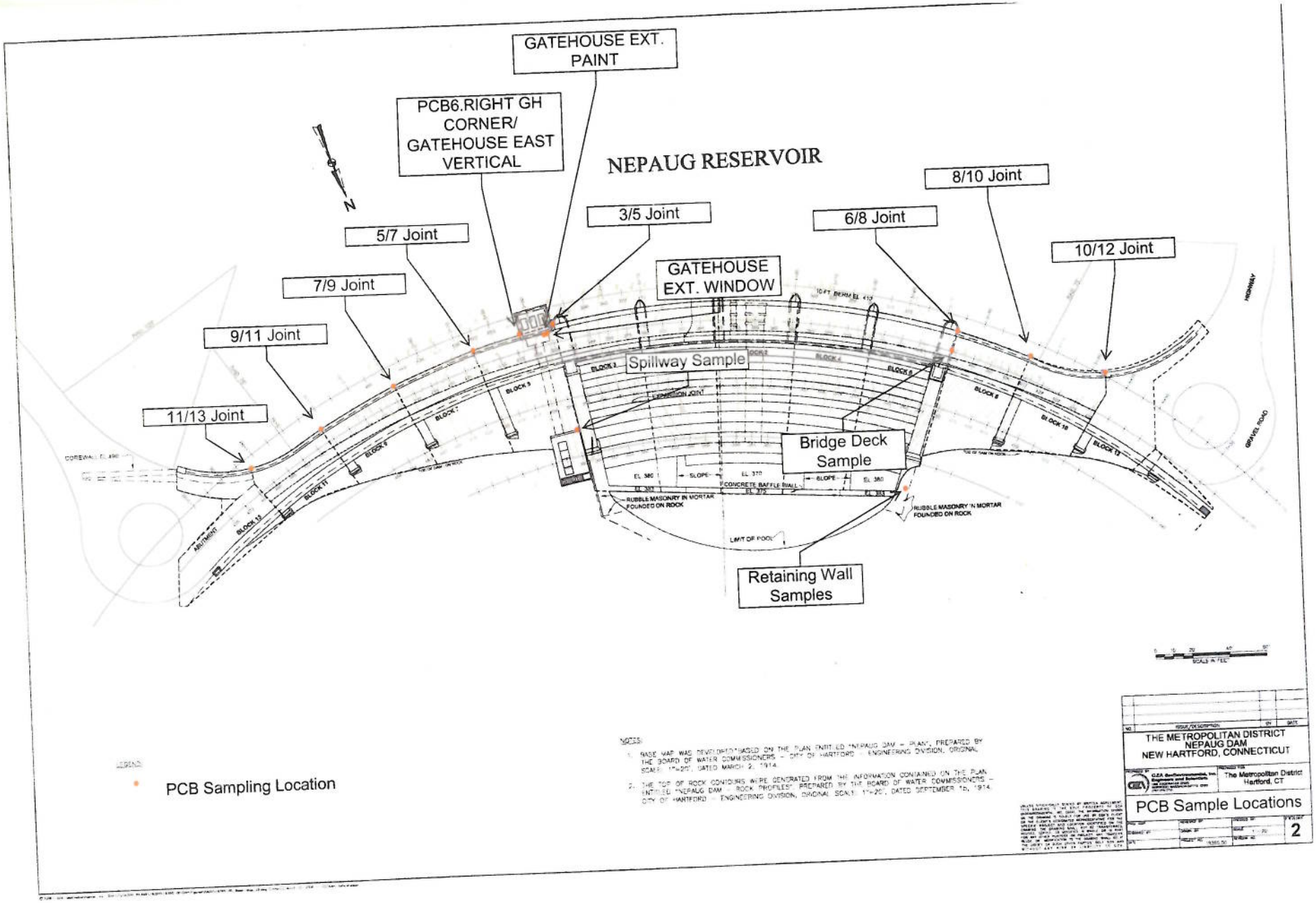
All results in ppm (mg/kg)

**Table 3**
Data Quality Criteria and Measurement Frequency
MDC Nepaug Dam
Burlington, Connecticut

| DATA QUALITY INDICATOR | PERFORMANCE CRITERIA | SAMPLE OR ACTIVITY USED TO ASSESS PERFORMANCE | FREQUENCY |
|---|---|---|---|
| **Matrix Bulk Samples** | | | |
| Precision-overall | ±45% | Field duplicates | Minimum: One per group or 10% of samples |
| Precision-laboratory | ±45% | 1. Matrix spike<br>2. Matrix spike duplicates | One per 20 samples |
| Accuracy/bias | Percent recovery limits 40-140% | 1. Matrix spike<br>2. Matrix spike duplicates | One per 20 samples |
| Accuracy/bias | Percent recovery limits 40-140% | Laboratory control samples | One per analytical batch |
| Accuracy/bias-contamination | No target analytes above laboratory quantification limit | 1. Field or Equipment blanks<br>2. Method blanks | 1. Minimum: One per sample group<br>2. One per analytical batch |
| Comparability | Not applicable | Comparability check | |
| Data Completeness | 90% Overall | Data completeness check | |
| Sensitivity | Low standard at or below Reporting limit | Low calibration standard | Sample analysis Cannot proceed with-Out a valid initial calibration |
| Accuracy | Percent recovery limits 30-150% | Surrogates | In every QC and field sample |




| | | |
|---|---|---|
| FIGURE 1 | **SITE LOCUS MAP**<br>**NEPAUG RESERVOIR DAMS** | SCALE<br>0 1,000 2,000 Feet |
| JOB NO. 19395.00 | METROPOLITAN DISTRICT COMMISSION DAMS<br>NEW HARTFORD AND BURLINGTON, CONNECTICUT | BASEMAP SOURCE: |


GATEHOUSE EXT. PAINT
PCB6.RIGHT GH CORNER/ GATEHOUSE EAST VERTICAL
NEPAUG RESERVOIR
N
8/10 Joint
3/5 Joint
6/8 Joint
5/7 Joint
10/12 Joint
GATEHOUSE EXT. WINDOW
7/9 Joint
9/11 Joint
Spillway Sample
11/13 Joint
Bridge Deck Sample
Retaining Wall Samples
PCB Sampling Location
THE METROPOLITAN DISTRICT
NEPAUG DAM
NEW HARTFORD, CONNECTICUT
PCB Sample Locations
2

**APPENDIX A**

LIMITATIONS

## LIMITATIONS

1. The observations described in this report were made under the conditions stated therein. The conclusions presented in the report were based solely upon the services described therein, and not on scientific tasks or procedures beyond the scope of described services or the time and budgetary constraints imposed by Client.

2. The conclusions and recommendations contained in this report are based in part upon the data obtained from a limited number of samples obtained from widely spaced subsurface explorations. The nature and extent of variations between these explorations may not become evident until further exploration. If variations or other latent conditions then appear evident, it will be necessary to reevaluate the conclusions and recommendations of this report.

3. Except as noted within the text of the report, no quantitative laboratory testing was performed as part of our work. Where such analyses have been conducted by an outside laboratory, GZA has relied upon the data provided, and has not conducted an independent evaluation of the reliability of these data.

4. The conclusions and recommendations contained in this report are based in part upon various types of chemical data and are contingent upon their validity. These data have been reviewed and interpretations made in the report. Moreover, it should be noted that variations in the types and concentrations of contaminants and variations in their flow paths may occur due to seasonal water table fluctuations, past disposal practices, the passage of time, and other factors. Should additional chemical data become available in the future, these data should be reviewed by GZA and the conclusions and recommendations presented herein modified accordingly.

5. Chemical analyses have been performed for specific parameters during the course of this assessment, as described in the text. However, it should be noted that additional chemical constituents not searched for during the current study may be present at the site.

6. It is recommended that GZA be retained to provide further engineering services during construction and/or implementation of any remedial measures recommended in this report. This is to allow GZA to observe compliance with the concepts and recommendations contained herein, and to allow the development of design changes in the event that subsurface conditions differ from those anticipated.

**APPENDIX B**

PHOTOGRAPHS

GZA GeoEnvironmental, Inc.

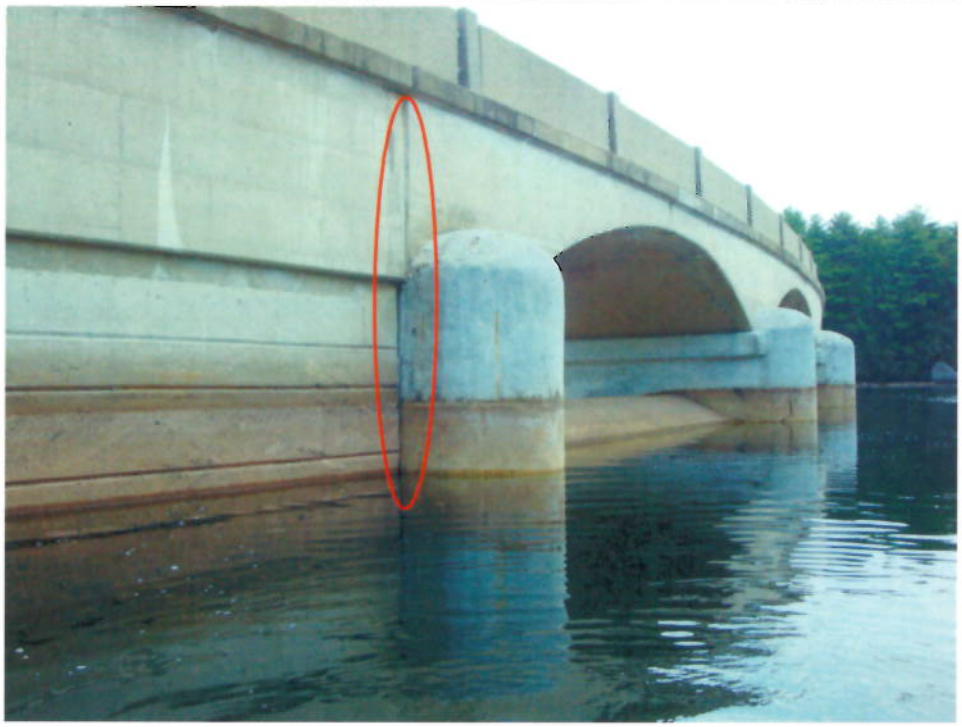
# PHOTOGRAPHIC LOG

| Client Name: | Site Location: | Project No. |
|---|---|---|
| The Metropolitan District | Nepaug Dam<br>Burlington, CT | 01.0019395.70 |

| Photo No. | Date: |
|---|---|
| 1 | 07/21/10 |

**Direction Photo Taken:**

**Description:**
Joint 6/8
(Left Spillway Abutment)



| Photo No. | Date: |
|---|---|
| 2 | 07/21/10 |

**Direction Photo Taken:**

**Description:**
Close up of Joint 6/8

GZA GeoEnvironmental, Inc.

# PHOTOGRAPHIC LOG

| Client Name: | Site Location: | Project No. |
|---|---|---|
| The Metropolitan District | Nepaug Dam<br>Burlington, CT | 01.0019395.70 |

| Photo No. | Date: |
|---|---|
| 3 | 07/21/10 |

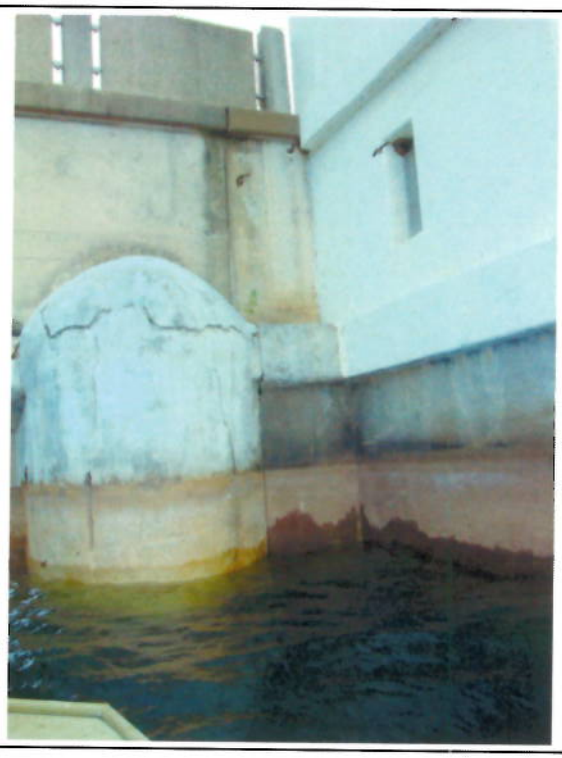
**Direction Photo Taken:**

**Description:** Joint 3/5, where cutwater meets upstream face of dam near right spillway abutment.

| Photo No. | Date: |
|---|---|
| 4 | 07/21/10 |

**Direction Photo Taken:**

**Description:** Broader view of right spillway abutment cutwater, where it joins the face of the dam. Upper Gatehouse seen in the right-hand portion of the photograph.



GZA GeoEnvironmental, Inc.

# PHOTOGRAPHIC LOG

| Client Name: | Site Location: | Project No. |
|---|---|---|
| The Metropolitan District | Nepaug Dam<br>Burlington, CT | 01.0019395.70 |

| Photo No. | Date: |
|---|---|
| 5 | 07/21/10 |

**Direction Photo Taken:**

**Description:** Overview of Nepaug Spillway and Bridge

| Photo No. | Date: |
|---|---|
| 6 | 07/21/10 |

**Direction Photo Taken:**

**Description:**
Left (west) Spillway Discharge Channel Wall

GZA GeoEnvironmental, Inc.

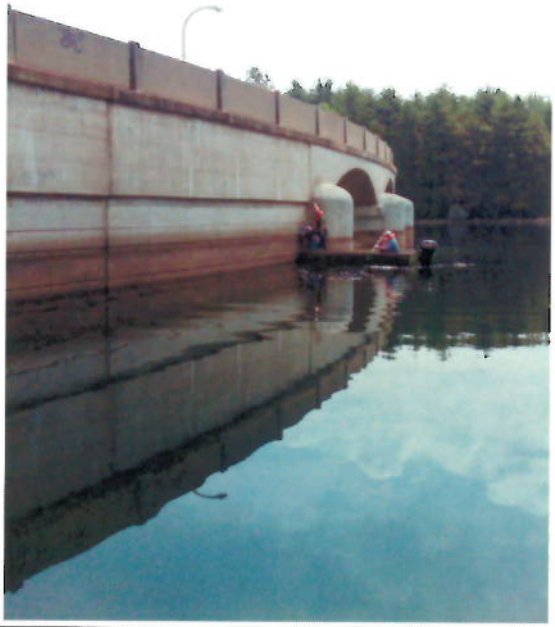
# PHOTOGRAPHIC LOG

| Client Name: | Site Location: | Project No. |
|---|---|---|
| The Metropolitan District | Nepaug Dam<br>Burlington, CT | 01.0019395.70 |

| Photo No. | Date: |
|---|---|
| 7 | 07/21/10 |

**Direction Photo Taken:**

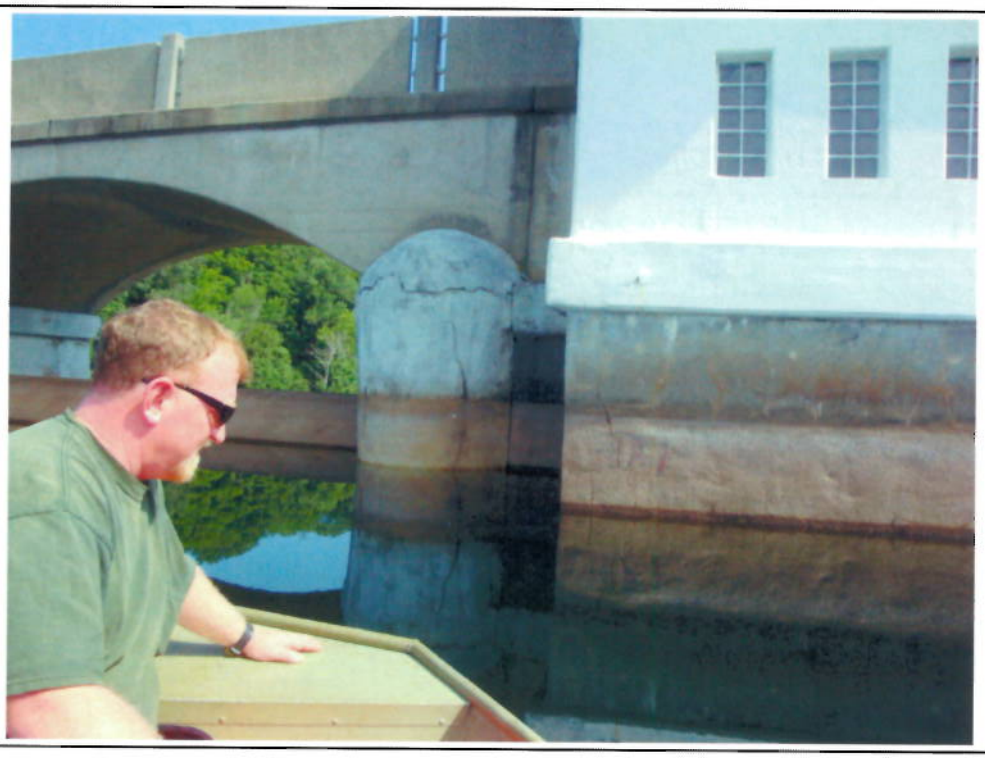
**Description:** Sampling at Joint 6/8



| Photo No. | Date: |
|---|---|
| 8 | 07/21/10 |

**Direction Photo Taken:**

**Description:** Cutwater and Gatehouse adjacent to right abutment of spillway.



GZA GeoEnvironmental, Inc.

# PHOTOGRAPHIC LOG

| Client Name: | Site Location: Nepaug Dam | Project No. |
|---|---|---|
| The Metropolitan District | Burlington, CT | 01.0019395.70 |

| Photo No. | Date: |
|---|---|
| 9 | 07/21/10 |

**Direction Photo Taken:**

**Description:**
Close up of caulking at Joint 11/13 near eastern shore.

| Photo No. | Date: |
|---|---|
| 10 | 08/11/10 |

**Direction Photo Taken:**

**Description:**
Caulk and Concrete Sampling at Joint 11/13

**APPENDIX C**

LABORATORY ANALYTICAL DATA

**APPENDIX D**

MDC SAMPLING MEMORANDUM

resurfaced in 1980 with blocks that were not resurfaced at that point (see attached drawing). In other words places where older concrete meets newer concrete. The grey caulk may also be present in joints between two blocks of older concrete (joints 3-5, 1-3, 1-2, 2-4 and 4-6) GZA indicated they sampled joint 3-5 and PCBs were not detected in that sample but we cannot be sure the grey caulk is not there until the joint is inspected by the MDC.

Blocks 11, 9, 7, 5, 8, 10 and 12 were resurfaced in 1980 and the caulk in joints between these blocks was removed. There should not be any 1974 caulk remaining between these blocks and therefore no source of PCBs. The only exception is, as stated above, where block 11 and block 8 meet up with blocks 13 and 6, respectively, which were not resurfaced in 1980.

Gatehouse

Caulk samples were not collected from the windows of the upper gatehouse because of concerns over ruining the water tightness of the window. The caulk in the windows is not degraded like the caulk on the dam (see attached photo). The upper gatehouse windows and window perimeters were refurbished in 2004 and are in excellent condition. Paint samples were not collected during the September visit because of access issues.

Miscellaneous Samples

In October 2008 GZA also collected caulk samples from a joint in the bridge deck and the point where the downstream face of block 5 meets the top of the lower gatehouse. PCBs were not detected in these samples.

Next Step

Concrete and water samples still need to be collected from joint 6-8. A concrete sample also needs to be collected from block 11 to determine if PCBs have leached to the west side of the joint. A detailed visual inspection including photos will be conducted on all joints on the upstream face except joints 11-13, 9-11 and 6-8. Additional information is not needed at these locations. Caulk and concrete samples will be collected where grey caulk and old concrete are identified. Caulk samples will also be collected from joints that have not been sampled to date. Concrete samples will be collected using methods described in EPA's *Standard Operating Procedure for Sampling Concrete in the Field*, dated 12/30/97.

A sample of the peeling paint will be collected from inside the upper gatehouse. Paint will be completely removed from an area and a concrete sample will be collected.

Although the concentration of PCBs seen in the 11-13 grey caulk sample (240,000 ppm) is very high the concentration dropped dramatically just 1.5" into the concrete from the joint and the surface of the dam.

Preliminary Plan

Based on the current theory that they grey caulk placed prior to 1980 is the source of the PCBs, the preliminary remedial plan is to remove caulk at joints not included in the 1980 resurfacing work (joints 11-13, 6-8, 4-6, 2-4, 1-2, 1-3, and 3-5) where the caulk may potentially contain PCBs.

## Nepaug Dam Caulk Samples

| Joint Numbers | GZA Sample Result | MDC 8-21-09 Result | MDC 9-11-09 Result | Color of Caulk | Comments |
|---|---|---|---|---|---|
| **East Side of Dam** | | | | | |
| 11-13 | | | **240,000 ppm** | Dark Grey | Evidence white caulk sampled. Sample originally labeled 9-11 by GZA. |
| | **138 ppm** | | **150 ppm** | White | |
| 9-11 | ND | ND | | White | GZA sample originally labeled 7-9. Concrete, foam, and tar samples collected by MDC. |
| 7-9 | | ND | | White | No evidence caulk was sampled. |
| 5-7 | | ND | | White | |
| East GH | ND | | | NA | Not inspected by MDC. |
| 3-5 | ND | | | NA | East edge of spillway, not inspected by MDC. |
| 1-3 | | | | NA | Spillway |
| 1-2 | | | | NA | Spillway |
| **West Side of Dam** | | | | | |
| 2-4 | | | | NA | Spillway |
| 4-6 | | | | NA | Spillway |
| 6-8 | ND | **66 ppm** | | Light Grey | West edge of spillway. Sample originally labeled 6-4 by MDC. |
| 8-10 | ND | | | White | |
| 10-12 | | ND | | White | Sample originally labeled 8-10 by MDC. |

Note:

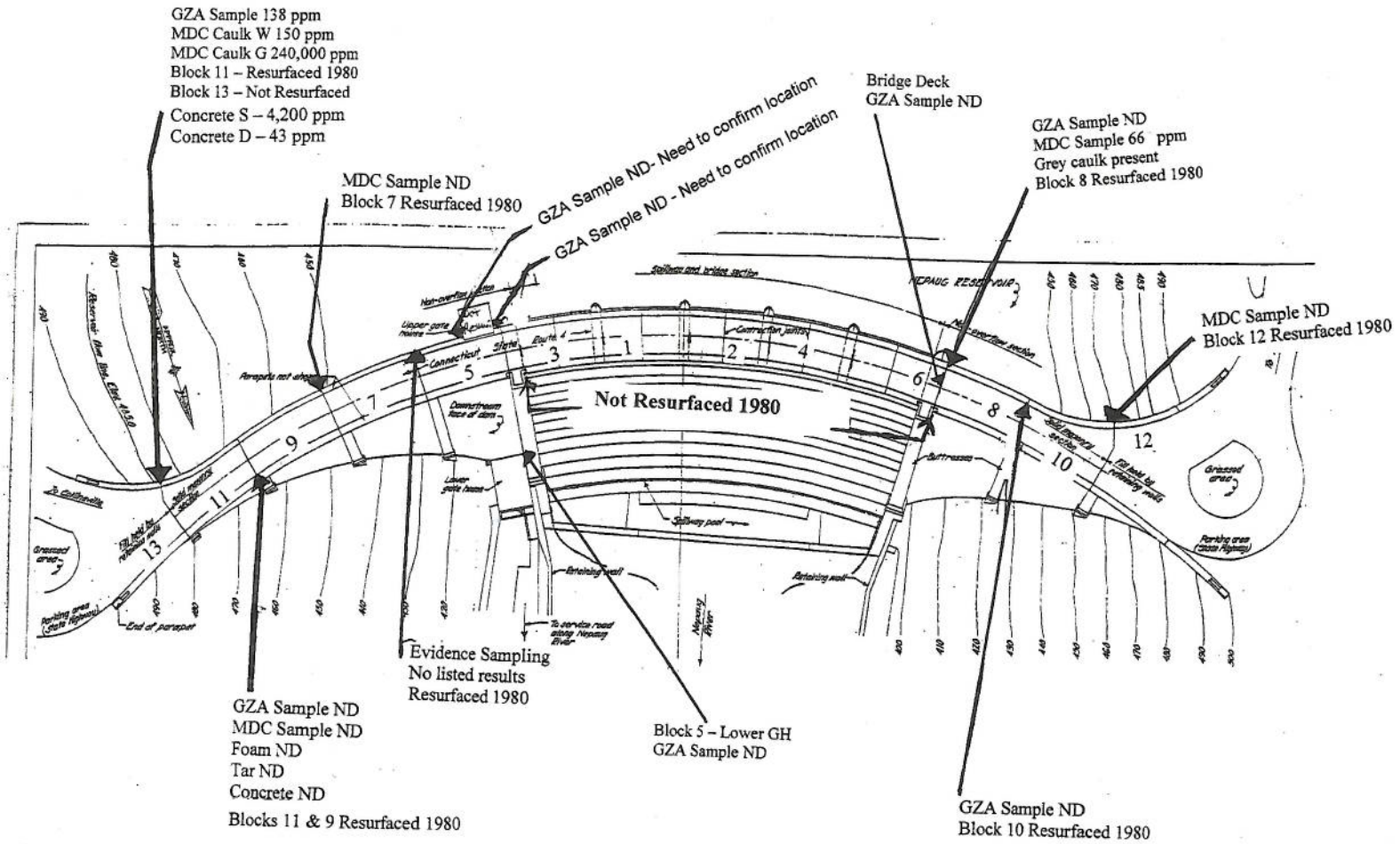
East GH = East side of gatehouse where it meets the dam.

= No sample collected.

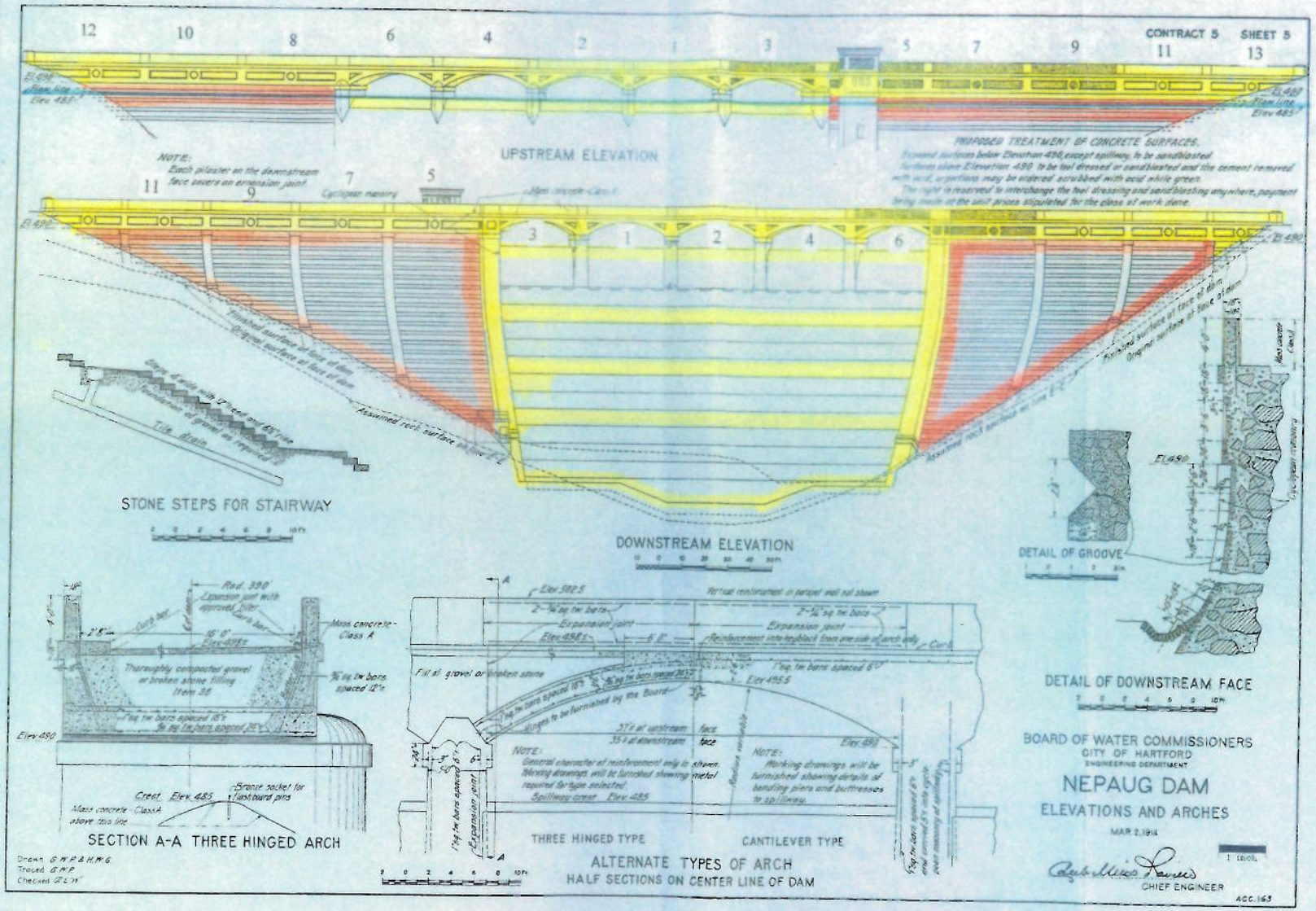
**Bold** = Concentration is above TSCA limit of 50 ppm.

## Nepaug Dam Additional Samples

| Location | Sample Type | Date | Result | Comments |
|---|---|---|---|---|
| 9-11 | Foam | 8-21-09 | ND | Foam backer behind the caulk. |
| 9-11 | Tar | 8-21-09 | ND | Taken from the east side of the joint below the caulk. |
| 9-11 | Concrete | 8-21-09 | ND | Taken just below the caulk. |
| 11-13 | Water | 9-11-09 | ND | Taken 4 inches below water surface right at the joint. |
| 13 | Concrete | 9-11-09 | 4,200 ppm | Older concrete just below the caulk on east side of 11-13 joint. |
| 13 | Concrete | 9-11-09 | 43 ppm | Older concrete 1.5" below the caulk on east side of 11-13 joint. |




NOTES:
Caulk W = White Caulk
Caulk G = Grey Caulk
Concrete S = Shallow Concrete
Concrete D = Deep Concrete




1974

1980